

**Summary of ORD Sediment Activities — Draft —6/5/00**

| <b>Area</b>   | <b>Organization</b>  | <b>Description</b>   | <b>Product/Estimated Date<br/><i>GPRA APGs/APMs in italics</i></b> | <b>Contact</b>   |
|---|--|--|--|--|
| <p><b>Program Implementation</b></p> <p>Activities related to implementing regulatory and remediation programs. These activities are applications of existing methods and technologies.</p> | <p>ORD/NRMRL/<br/>LRPCD/ETSC</p> <p>NERL/ERD/<br/>CEAM</p> <p>NERL/ESD/<br/>MSCTSC</p> <p>NERL/ESD/<br/>EPIC</p> | <p><b>Site-specific technical support:</b> Assistance is provided to EPA regions for characterization and remediation of contaminated sediment sites. In FY01-02, support expands to RCRA CA as well as Superfund. Support can be provided to OSW and OW programs depending on inhouse staff availability.</p> | <p>Assistance provided to individual requests</p>                  | <p>David Reisman<br/>513-487-2588<br/>ETSC</p> <p>Frank Stancil<br/>706-355-8100<br/>Dave Brown<br/>706-355-8300<br/>CEAM</p> <p>Ken Brown<br/>702-798-2270<br/>Brian Schumacher 702-798-2242<br/>MSCTSC</p> <p>Don Garofalo<br/>703-648-4285<br/>EPIC</p> |

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| <b>Effects</b><br><br>Activities related to determining the effects of sediment contaminants on human and ecological receptors. These activities advance the state-of-the-art by development and verification of methods, models, protocols, and technologies. | NHEERL/AED<br>NHEERL/MED | <b>Development of toxicity identification evaluation methods for porewaters and whole sediments</b> - This work will help further develop toxicity identification evaluation methods for porewaters and whole sediments in both fresh and salt water. These methods are well developed for effluents, but further testing and field validation are needed for porewater, and methods for whole sediments need to be developed. | <i>EPA report on whole sediment TIE methodology, expected FY 02, APM A77, FY01</i>   | Kay Ho<br>401-782-3196<br>Dave Mount<br>218-529-5169                |
|  | NHEERL/MED               | <b>Development of methods for testing short-term and chronic toxicity of freshwater sediments</b> - Methods for testing short-term and chronic toxicity of freshwater sediments have been developed and tested, and a round-robin was conducted.   | Manual of methods for testing short-term and chronic toxicity of freshwater sediments, FY00.   | David Mount<br>218-529-5169<br>Theresa Norberg-King<br>218-529-5163 |
|  | NHEERL/AED               | <b>Development of alternate measures of benthic infaunal condition</b> - The usefulness of new approaches for assessing benthic condition being examined, including CatScan and methods for examining the effects of porewater ammonia. The use of new technologies may provide faster and perhaps less expensive estimates of benthic infaunal health.  | Comparative estuarine method to discern and quantify the ecological effects of cumulative, multiple anthropogenic point sources on benthic communities, FY00. Sensitivity of NH3 porewater and tube/tunnel structures in soft bottom sediments and macrofaunal community composition to detect changes in season, habitat and estuarine system, FY01 | Ken Perez<br>401-782-3052<br>Kay Ho<br>401-782-3196                 |

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|      | NHEERL/MED   | <b>Horizontal and vertical heavy metal contamination in Lake Michigan</b> - Lake-wide sampling and analysis of mercury in surface sediments and sediment cores is being done in coordination with the Lake Michigan Mass Balance Project and the Great Lakes National Program Office. Sediments are being examined for the mercury inventory in Lake Michigan, and models are being developed to assess the effects of mercury to fish. Sediment inventory and resuspension and movement are being examined in relation to atmospheric and tributary inputs to the system. | Data report of mercury in Lake Michigan and mathematical modeling relating sources to effects on fish, FY03  | Ron Rossman<br>734-692-7612                                      |
|      | NHEERL/MED   | <b>Modeling of bioaccumulation of organic chemicals</b> - Models are being developed to predict bioaccumulation of PBTs, such as dioxins, PCBs and PAHs, in fish and wildlife, in ecosystems with varying bioavailability of contaminants from sediment and water as well as differences in food web structures.   | Improved models and tools, including integrated sediment/water quality criteria, for assessing risks associated with contaminated sediments on the basis of predicted residues in fish and wildlife, FY05. | Lawrence Burkhard<br>218-529-5164<br>Philip Cook<br>218-529-5202 |
|      | NHEERL/MED   | <b>Importance of dietary metals uptake in effects of metals-contaminated sediments</b> - It is known that metal can be bioaccumulated from sediments with low metals concentration, but the effects associated with metals tissue residues are poorly understood. Experiments are currently underway to assess the effects on fish of the uptake of dietary metals from food that has taken up its metals from contaminated sediment.  | Published manuscripts, FY02  | David Mount<br>218-529-5169                                      |

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|      | NHEERL/AED   | <b>Field demographic study of amphipods</b> - This project is exploring the usefulness of a field indicator of benthic condition using amphipod field demographics. The approach uses base-line data from a reference site (e.g., sex ratio, abundance, biomass and productivity) relative to contaminated sites. The approach also looks at geographic differences in sensitivity to contaminants to see if bioavailable contaminants are driving genetic differences between populations..   | Published manuscripts, FY00-04   | Anne Kuhn<br>401-782-3199  |
|      | NHEERL/AED   | <b>Examine correlations between measured chemistry, acute toxicity and benthic community data in field databases</b> - In this study the usefulness of measured chemistry data in the prediction of biological effects from large field databases (e.g., EMAP) will be examined using three approaches. In one approach equilibrium partitioning-derived sediment guidelines will be used to predict acute toxicity to amphipods from measured chemistry data. In another approach measured chemistry data will be compared to benthic community data directly. In a third approach a population model will be used to predict effects on the benthic community using acute toxicity data. | Manuscripts, FY02-04.  | Anne Kuhn<br>401-782-3199<br>Walter Berry<br>401-782-3101<br>Margarite Pelletier<br>401-782-3131 |
|      | NHEERL/GED   | <b>Toxicity of contaminated sediments to aquatic plants and periphyton</b> - This research task is examining the development of methods and applications of those methods of toxicity assessment using estuarine aquatic plants (primarily SAV) and periphyton.  | <i>Report on the use of periphyton as indicators of metal contaminants in estuaries, APM 551, FY00.</i><br>Predictive laboratory phytotoxicity test methods on contaminated sediments using seagrasses, FY01.<br>Report on effects of xenobiotics and nutrients on aquatic vegetation, FY03. | Michael Lewis<br>850-934-9382  |

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|      | NCER/<br>STAR grants and<br>HSRCs | Environmentally-Mediated Endocrine Disruption in Estuarine Crustaceans: A 3-Taxon Multi-Generational Study of Sediment-Associated EDC Effects from the Genetic to Population Levels |  | G. Thomas Chandler, Ph.D.  |
|      | NCER/<br>STAR grants and<br>HSRCs | Site-specific Validation of a Chronic Toxicity Test with the Amphipod <i>Hyaella azteca</i> : An Integrated Study of Heavy Metal Contaminated Sediments in Peak Creek, Virginia     |  | John Cairns, Jr., B. R. Niederlehner, Reese Voshell, and Eric P. Smith |
|      | NCER/<br>STAR grants and<br>HSRCs | Phylogenetic Analysis of Microbial Communities in Contaminated Nearshore Marine Sediments   |  | Russell P. Herwig  |
|      | NCER/<br>STAR grants and<br>HSRCs | Foraminifera as Ecosystem Indicators: Phase 1. A Marine Benthic Perturbation Index; Phase 2. Bioassay Protocols   |  | Pamela Hallock Muller  |
|      | NCER/<br>STAR grants and<br>HSRCs | Sediment Contaminant Effects on Genetic Diversity New Approach using DNA Analyses of Meiobenthos  |  | Bruce C. Coull, G. Thomas Chandler and Joseph M. Quattro               |
|      | NCER/<br>STAR grants and<br>HSRCs | Digestive Solubilization of Sediment-Sorbed Contaminants A Comparison of In Vitro and In Vivo Processes   |  | Donald P. Weston, Larry M. Mayer, and Deborah L. Penry                 |
|      | NCER/<br>STAR grants and<br>HSRCs | Transport of Polychlorinated Biphenyls from Adult Oyster <i>Crassostrea virginica</i> to Embryos and Larvae and Potential for Reproductive and Developmental Impairments            |  | Fu-Lin E. Chu, Aswani K. Volety, and Robert C. Hale                    |
|      | NCER/<br>STAR grants and<br>HSRCs | Uptake of Sediment-Associated Contaminants by the Deposit-Feeding Amphipod <i>Leptocheirus Plumulosus</i> (Shoemaker): Effects of Natural Sediment Qualities                        |  | Christian Schlekert  |

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|   | NCER/<br>STAR grants and<br>HSRCs | Biochemical Indicator Patterns and their Linkages to Adverse Effects on Benthic Invertebrate Patterns   |  | Teresa Fan, Richard Higashi   |
| <b>Exposure</b><br><br>Activities related to determining exposure of human and ecological receptors to contaminated sediments. These activities advance the state-of-the-art by development and verification of methods, models, protocols, and technologies. | NERL/EERD                         | <b>Development of Indicators as Measures of Ecosystem Sustainability</b> - Indicator methods can be used to measure PAH exposure, to determine exposure exceeding natural background, and to evaluate changes in exposure to petroleum and combustion by-product (PAH) waste in dredged streams.  | Draft report on national background and exposure criteria for indicators of exposure to PAHs - FY02  | Susan Cormier<br>513-569-7995   |
|   | NHEERL/MED<br>NHEERL/AED          | <b>Bioavailability of polycyclic aromatic hydrocarbons (PAHs) in sediments</b> - To better understand the bioavailability of PAHs in freshwater and marine sediments a series of studies are underway. These investigations have as their primary objective to quantify the acute and sublethal toxic effects of PAHs to benthic freshwater and marine species. Specific studies include (1) evaluation of the effects of ultraviolet radiation on the toxicity of PAHs, (2) determination of the contribution of highly insoluble PAHs (i.e., $\log K_{ow} > 5.5$ ) to toxicity, and (3) assessment of the effects of pyrogenic PAH geochemistry on PAH bioavailability. | <i>Report on predicting metal toxicity in sediments, APM152, FY99</i><br><br>Peer-reviewed publications and technical guidance to support derivation of Agency sediment guidelines | Dave Mount<br>218-529-5169<br>(freshwater)<br>Rob Burgess<br>401-782-3106<br>(marine) |

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|      | NHEERL/MED<br>NHEERL/AED | <b>Bioavailability of metals in sediments</b> - To better understand the bio availability of metals in freshwater and marine sediments a series of studies are underway. These investigations have as their primary objective to quantify the acute and sublethal toxic effects of metals to benthic freshwater and marine species. Specific studies include (1) analysis of the toxicity of chromium when associated with anoxic sediments, (2) evaluation of the effects of resuspension on the fate and bioavailability of anoxic metal-contaminated sediments, and (3) performance assessment of <i>in situ</i> interstitial water sampling methods. | <i>Report on predictively metal toxicity in sediments, APM 152, FY99.</i><br><br>Peer-reviewed publications and technical guidance to support derivation of Agency sediment guidelines | Dave Mount<br>218-529-5169<br>(freshwater)<br>Walter Berry<br>401-782-3101<br>Rob Burgess<br>401-782-3106<br>(marine) |

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|      | NERL/ERD     | <b>Develop Computer Models for Science Integration and Parameterization of Multimedia Models for Watershed Scale Analysis and General Multimedia Exposure Assessments</b> - to elucidate and model the underlying processes (physical, chemical, enzymatic, biological) that describe the transport and fate of organic pollutants and other stressors in environmental systems. Extend/refine/test existing process models in SPARC (SPARC Performs Automated Reasoning in Chemistry) and develop this process capability for redox and hydrolytic processes. Develop soil-physical, soil-chemical, and biogeochemical models to estimate, from commonly catalogued data, key environmental descriptors (eH, pH, and composition/status of the microbial communities) that will be required in these process models. Construct software interfaces to directly link SPARC to environmental systems models and thus provide not only for model parameterization but for real time upgrades of reactivity parameters during model execution. | <p><i>Configure SPARC (SPARC Performs Automated Reasoning in Chemistry) as a prototype processes constants generator of pollutant fate for organic pollutants; and incorporate planned products on mathematical techniques to quantify coupled chemical speciation processes, and kinetic models describing reductive transformations processes (APM, 9/01)</i></p> <p><i>Configure SPARC as a prototype processes constants generator of pollutant fate for organic pollutants; and implement completed speciation models for ionization and tautomerization, and prototype models for hydrate formation, solution phase hydrolysis, and abiotic reduction in sediment suspensions (APM, 9/02)</i></p> | Samuel W. Karickhoff<br>706-355-8321 |
|      | NERL         | <b>Characterize the Sorption of Organic Pollutants in Soils and Sediments for SPARC</b> - to measure the magnitude and kinetics of organic contaminant sorption and transport in soils and sediments, to apply and compare the utility of bicontinuum and distributed parameter models for describing contaminant release from soils and sediments, and to use the measured and estimated sorption/desorption kinetic descriptors developed for assessing long-term contaminant release from soils and sediments.   | <i>Report on solute release kinetics from contaminated soils and sediments (APM, 9/02)</i>  | Dermont Bouchard 706-355-8333        |



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|      | NERL/EERD    | <b>Develop Stressor Signatures of Habitat Degradation Among Metrics from Fish, Benthic Macroinvertebrate, and Periphyton Assemblages</b> - Development and evaluation of biological indicators and preparation of OW-ORD Stressor Identification Evaluation Guidelines that help to identify stressors and sources, including sediments.   | Method for developing diagnostic signatures; compendium of Regional case-studies that describe how causes of biological impairment were determined, FY01-FY02.<br><br><i>Compendium of case studies illustrating the application of SIE guidelines, A75, FY01.</i> | Susan Cormier<br>513-569-7995 |
|      | NERL/EERD    | <b>Real-Time Aquatic Biomonitoring Using Bivalves in Two Watersheds.</b> The water quality of two watersheds were monitored. A monitoring station was placed on the Little Miami River, Cincinnati, OH. Two biomonitoring sites were used in the Elm Fork of the Trinity River drainage; one on Pecan Creek, Denton, TX, and a second in Lake Lewisville, Lewisville, TX. Data were collected every five minutes and telemetered to remote servers via cellular data connections, for processing. Data were then presented via the Internet in real-time. Both biological and physical/chemical metrics were recorded. The gape behavior of the bivalve <i>Corbicula fluminea</i> was used as a monitor of overall water quality. Observed behavior was compared to laboratory baseline behavior to determine effects. Frequency of positive and false positive responses were evaluated. Physical/chemical parameters were measured using datasondes. |  | Jim Lazorchak<br>513-569-7076 |

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|      | NERL/ERD     | <b>Hazardous Waste Identification Rule (HWIR)</b> - This multimedia, multi-receptor, multi-stressor, open architectural modeling system is designed for establishing safe exit levels for some waste streams that may now require disposal in Subtitle C facilities. The methodology is site-scale in nature but designed for National application, and includes a variety of exposure pathways for both human and ecological exposures in air, surface water and groundwater media, and terrestrial, aquatic and farm food chain relationships. Specific to sediments in the HWIR application, ExamsIO presently simulates suspended solids as a conservative substance. Plans are to add simple routines to ExamsIO to handle net deposition, bed load in streams, and burial in ponds/lakes/wetlands/bays for more realistic estimates of TSS which would be passed to Exams. | <p><i>HWIR Human Health and Ecosystems Site (Generic)</i><br/> <i>Exposure - Risk Assessment</i><br/> <i>Screening Model Peer Reviewed and Applied to HWIR Listed Chemical Exit Levels - APM 187, 1999</i></p> <p><i>Update the HWIR99 Modeling Methodology for Delisting Hazardous Wastes, in response to public comments on 1999 Federal Register Notice, and incorporating enhanced uncertainty analysis techniques into the revised methodology - APM BB8, FY01</i></p> <p>Critical Review of Documented Aquatic and Terrestrial Plant Phyto Processes and Data Complete with Formulation of Kinetic Algorithms for Organic and Inorganic Pollutants of Concern - FY01</p> | Dave Brown<br>706-355-8300<br>Gerry Laniak<br>706-355-8316<br>Steve McCutcheon<br>706-355-8235 |
|      | NERL/ESD     | <b>SITE Demonstration of Sediment Sampling Technologies</b> - The two technologies tested were a split core sampler for submerged sediments and a Russian peat borer. Research will provide objective evaluations of innovative sediment sampling technologies as compared to standard reference sampling technologies. Sediment sampling technologies will be examined for their efficiencies and capabilities to collect undisturbed sediment cores without cross-contaminating other sediment strata.   | Demonstration Plan for Sediment Sampling - 1999<br>Verification Reports for Sediment Sampling - 2000   | Steve Billets<br>702-798-2232<br>Brian Schumacher<br>702-798-2242                              |

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|      | NERL/HEASD   | <b>Biosensors</b> - Biosensor research is addressing the critical and growing need for real-time and in situ monitoring devices which can be used cost-effectively at Superfund sites and RCRA facilities, as well as for ground-water monitoring. Biosensors are being evaluated for detection of environmental contaminants such as phenols and pesticides. | <p>Biosensors for Field Analytical Monitoring, Field Anal. Chem. Technol. 2, 317-331 - 1999</p> <p>Determination of Phenols in Environmentally Relevant Matrices Using a Liquid Chromatographic System with an Enzyme-Based Biosensor. Field Anal. Chem. Technol. 3, 161-169 - 1999</p> <p>Organophosphorus Hydrolase-Based Assay for Organophosphate Pesticides. Biotechnol Progress 15, 517-521 - 1999</p> <p>Biosensors for Environmental Monitoring: An Update. Environ. Sci. Technol. Dec. 1, 500-506, 1999</p> <p>Field Method/Biosensor for Detection of Phenols in Soil Leachate from Contaminated Superfund Sites - 2001</p> <p>Microchip-Based CE System with Biosensor Detector for Measurement of Phenols - 2002</p> | <p>Kim Rogers<br/>702-798-2299</p> <p>Jerry Blancato<br/>702-798-2456</p> |

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|      | NERL/HEASD                         | <b>Immunochemistry</b> - Immunochemistry offers rapid, sensitive, low-cost portable, and simple field methods for analysis of environmental samples. Methods and applications are being developed for analytes such as PCBs, pesticides and heavy metals that are found at Superfund and RCRA sites.  | Immuno assay Test Kits in Environmental Monitoring - to be published in Current Issues in Regulatory Chemistry, Publisher: Assoc. of Official Analytical Chemists (AOAC) - 1999<br>Comparison of Quantitative PCB ELISA with Gas Chromatography Determinative Versus Whole Method Effects - 2000<br>Monoclonal Antibodies for the Toxic Co-Planar PCBs and their Application to ELISA - 2001<br>PCB Detection Using a Doped Sol-Gel Modified Electrochemical Immunosensor - 2001<br><i>Antibody Coated Sampling/Introduction Probe for Ion Trap Determination of Coplanar PCBs - APM 561, FY01</i> | Jeanette van Emon<br>702-798-2154<br>Jerry Blancato<br>702-798-2456   |
|      | NERL/ESD<br>NERL/HEASD<br>Region I | <b>Mercury Cycling in the New England Estuaries: A Collaborative Study in Great Bay, NH (RARE Project)</b> - Research will examine cycling, bioavailability, and potential enhanced methylation of mercury in salt marshes in the Great Bay Estuary, NH. Mercury inputs from air and precipitation will be collected to calculate annual and seasonal deposition rates of Hg. Results from the study will provide information about typical Hg inputs and loading rates from multiple sources (air, water, sediment, plant conversion to methylated species) in a typical estuarine environment in New England. | Speciation of Hg Uptake by <i>Spartina Alterniflora</i> - 2000<br>Methylation and Hg Production in a <i>Spartina Alterniflora</i> Salt Marsh - 2000<br>Influx of Hg to the Great Bay Estuary via Fog - 2000<br>Volatile Hg Fluctuation in the Great Bay Estuary - 2000<br>Mercury Cycling in the Great Bay Estuary ; EPA Report - 2001   | Brian Schumacher<br>702-798-2242<br>Jeanette van Emon<br>702-798-2154 |

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|      | NERL/ESD     | <b>Environmental Analytical Chemistry</b> - This work is to provide state-of-the-science sampling, analysis, separation, and detection methods to allow rapid, accurate field and laboratory analyses of various media (e.g., surface or ground water, fish, sediments, soil). | Vacuum Distillation - hardware evaluation, operations manual, method development and testing, tech transfer to Regions - ongoing<br>Mercury in Fish from National Parks, PRIMENet data base - 2001<br>Reagent-free Determination of Mercury in Whole-Fish Homogenates Using a Combustion Furnace-Atomic Absorption Analyzer - 2001<br>Anthropogenic Chemical Loading in Fish from National Park Index Sites, journal article and data base - 2001<br>Fractionation of Toxic PCB Isomers Using Porous Graphitic Carbon HPLC and Determination by GC/HRMS - 2001 | Christian Daughton<br>702-798-2207 |

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|      | NERL-EERD<br>Region 2<br>Region 6 | <p><b>Miniaturized sediment procedures for assessing toxicity using marine and freshwater amphipods and embryo/larval fish.</b> Sediment toxicity tests are needed that can be conducted with less sediment volume and fewer organisms. Bench scale remediation techniques often produce less sediment than is required to perform the standardized sediment methods and the excess sediments that are generated present a potential hazardous waste disposal issue. Minimizing sample volumes reduces the time required to collect samples, prepare samples (sieving) and enumerate organisms at the end of the test. To address these issues we have modified existing USEPA methods that use significantly less sediment and fewer organisms than the standard toxicity tests and developed two alternative methods. Freshwater methods include a 7-day amphipod, <i>Hyalella azteca</i> method and 7-day fathead minnow (<i>Pimephales promelas</i>) embryo/larval hatching method and two marine methods, a 10-day amphipod, <i>Ampelisca abdita</i>, and a 7-day sheepshead minnow (<i>Cyprinodon variegatus</i>) embryo/larval method. Results on contaminated and uncontaminated sediments indicate that the miniaturized methods are comparable to the standardized test methods and the amount of time to prepare the samples and conduct the tests is significantly reduced.</p> |  | <p>Jim Lazorchak<br/>513-569-7076<br/>Jim Ferretti<br/>732 321 6728<br/>Terry Hollister<br/>281 983 2163</p> |

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|      | NERL-EERD                         | <b>A sediment toxicity method using <i>Lemna minor</i> (duckweed).</b> We developed a <i>Lemna minor</i> sediment toxicity test method to assess sediment contaminants which may affect plants. In addition to the duckweed method, sediments were also tested using a miniaturized freshwater amphipod method and a fathead minnow embryo/larval (FHM) survival test. Of the three endpoints used in duckweed tests, results indicated that chlorophyll <i>a</i> was a more sensitive measure than either frond number or wet weight. A sediment reference toxicant method has been developed for KCl and Atrazine. The duckweed method is convenient to use and provides an additional sediment toxicity indicator. |  | Jim Lazorchak<br>513-569-7076  |
|      | NCER/<br>STAR grants and<br>HSRCs | Developing Effective Ecological Indicators for Watershed Analysis   |  | DT. Duncan Patten,<br>Dr. Robert Crabtree,<br>Dr. Wayne Minshall, Dr.<br>Rick Lawrence |
|      | NCER/<br>STAR grants and<br>HSRCs | The Particle Size Distribution of Toxicity in Metal-Contaminated Sediments  |  | James Ranville, Donald<br>Macalady, Phillipe<br>Ross1, William<br>Clements             |
|      | NCER/<br>STAR grants and<br>HSRCs | A Modeling and Experimental Investigation of Metal Release from Contaminated Sediments<br>The Effects of Metal Sulfide Oxidation and Resuspension   |  | G. Thomas Chandler<br>Thimothy J. Shaw   |
|      | NCER/<br>STAR grants and<br>HSRCs | Processes Influencing the Mobility of Arsenic and Chromium in Reduced Soils and Sediments   |  | Scott Fendorf  |
|      | NCER/<br>STAR grants and<br>HSRCs | Trace Metal Dynamics in Reducing Aquatic Sediments Determination of Adsorption and Coprecipitation on Undisturbed Sediment Core Sections Using a Plug-Through Reactor   |  | Philippe Van Cappell   |

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|      | NCER/<br>STAR grants and<br>HSRCs | Formation and Propagation of Large-scale<br>Sediment Waves in Periodically Disturbed<br>Mountain Watersheds   |  | Gary Parker                            |
|      | NCER/<br>STAR grants and<br>HSRCs | Trophic Transfer of Atmospheric and<br>Sedimentary Contaminants Into the Great Lakes<br>Fisheries Controls on the Ecosystem Scale<br>Response Times |  | Joel E. Baker; Nathaniel<br>E. Ostrom, |
|      | NCER/<br>STAR grants and<br>HSRCs | Biogeochemical Control of Heavy Metal<br>Speciation and Bioavailability in Contaminated<br>Marine Sediments   |  | James Shine                            |
|      | NCER/<br>STAR grants and<br>HSRCs | Distribution of Cs-137 in the Lena River<br>Estuary-Laptev Sea System As Evidenced by<br>Marine, Estuarine and Lacustrine Sediments                 |  | Ashanti Johnson Pyrtle                 |
|      | NCER/<br>STAR grants and<br>HSRCs | Effects of Interactions Between Sediment<br>Components on Copper Sorption in Estuaries  |  | Kea Duckenfield                        |
|      | NCER/<br>STAR grants and<br>HSRCs | The Effect of Sulfate and Sulfide on Mercury<br>Methylation in Florida Everglades   |  | Janina Benoit                          |
|      | NCER/<br>STAR grants and<br>HSRCs | Metal Speciation and Sequestering in Wetland<br>Systems   |  | Edward Peltier                         |
|      | NCER/<br>STAR grants and<br>HSRCs | Determination of Sediment Contribution from<br>Unpaved Roads Within a Tropical Watershed  |  | Alan Ziegler                           |
|      | NCER/<br>STAR grants and<br>HSRCs | Effect of Natural Dynamic Changes on<br>Pollutant-Sediment Interaction  |  | Tomson, Kan                            |



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|      | NCER/<br>STAR grants and<br>HSRCs | Controls on Metal Partitioning in Contaminated Sediments   |  | F. M. Saunders; H. L. Windom, R. A. Jahnke                                |
|      | NCER/<br>STAR grants and<br>HSRCs | Source Identification, Transformation, and Transport Processes of N-, O-, and S-Containing Organic Chemicals in Wetland and Upland Sediments |  | W. James Catallo  |
|      | NCER/<br>STAR grants and<br>HSRCs | Sediment Resuspension and Contaminant Transport in an Estuary  |  | C. E. Adams, Jr., R. E. Ferrell, Jr.                                      |
|      | NCER/<br>STAR grants and<br>HSRCs | Pollutant Fluxes to Aquatic Systems via Coupled Biological and Physicochemical Bed-Sediment Processes  |  | Reible, Thibodeaux, Valsaraj, Fleeger                                     |
|      | NCER/<br>STAR grants and<br>HSRCs | The Role of Competitive Adsorption on Suspended Sediments in Determining Partitioning and Colloidal Stability                                |  | H. G. McWhinney   |
|      | NCER/<br>STAR grants and<br>HSRCs | Particle Transport and Deposit Morphology at the Sediment/Water Interface  |  | Mark R. Wiesner   |
|      | NCER/<br>STAR grants and<br>HSRCs | Mobilization and Fate of Inorganic Contaminants Due to Resuspension of Cohesive Sediment   |  | T. W. Sturm, A. Amirtharajah, and C. L. Tiller                            |
|      | NCER/<br>STAR grants and<br>HSRCs | Desorption of Nonpolar Organic Pollutants from Historically Contaminated Sediments and Dredged Materials                                     |  | Mason B. Tomson, Amy T. Kan, Gongmin Fu, Wei Chen, and Margaret A. Hunter |
|      | NCER/<br>STAR grants and<br>HSRCs | Freshwater Bioturbators in Riverine Sediments as Enhancers of Contaminant Release  |  | A. D. W. Acholonu   |

| Area  | Organization                      | Description  | Product/Estimated Date<br><i>GPRA APGs/APMs in italics</i>  | Contact   |
|---|-----------------------------------|--|---|---|
|   | NCER/<br>STAR grants and<br>HSRCs | Modelling Air Emissions of Organic Compounds from Contaminated Sediments and Dredged Materials   |   | K. T. Valsaraj, L. J. Thibodeaux, D. D. Reible; J. M. Brannon, T. E. Myers, C. B. Price; J. S. Gulliver |
|   | NCER/<br>STAR grants and<br>HSRCs | Characterization of Laguna Madre Contaminated Sediments  |   | A. N. S. Ernest   |
|   | NCER/<br>STAR grants and<br>HSRCs | Mobility and Transport of Radium in Sediment and Waste Pits  |   | DeLaune, Pardue, Patrick, Lindau  |
|   | NCER/<br>STAR grants and<br>HSRCs | Pollutant Fluxes to Aquatic Systems via Coupled Biological and Physicochemical Bed-Sediment Processes  |   | Reible, Thibodeaux, Valsaraj, Fleege  |
| <b>Assessment</b><br><br>Activities related to assessing the risk associated with human or ecological exposure to contaminants in sediments. These activities advance the state-of-the-art by development and verification of methods, models, protocols, and technologies. | NHEERL/GED                        | <b>Improved protocols to determine hazards of contaminated sediments in the Gulf of Mexico</b> - Development of existing field and laboratory data collected over the past 10 years in Gulf of Mexico estuaries to assess improvements in protocols for hazard assessments.  | Improved protocols to determine hazards of contaminated sediments in the Gulf of Mexico - FY03  | Michael Lewis<br>850-934-9382   |
|   | NCEA-W                            | <b>Sediment Toxicity Assessment Methods.</b> The method in development combines bulk sediment toxicity testing with chemical concentrations measured in the same samples. A large database of paired sediment toxicity and chemistry data has been compiled. This database has been used to develop logistic regression models that predict the probability of an adverse outcome, given the concentration of chemicals at a site. | <i>Final report describing the assessment method, APM A80, FY01</i><br><br>The method is being applied in the Office of Water's 2000 Report to Congress on Sediment Contamination Status and Trends | Susan Norton<br>202-564-3246  |

| Area | Organization | Description   | Product/Estimated Date<br><i>GPRA APGs/APMs in italics</i>   | Contact  |
|------|--------------|---|--|--|
|      | NHEERL/GED   | <b>Assessment of the relationship of contaminated sediments to estuarine biotic effects</b> - Using information collected through a variety of programs, statistical analyses are used to determine the types and strengths of relationships among contaminated sediment variables and biotic response variables. | Report on the relationship of toxicity of contaminated sediments to aquatic animals and vascular plants, FY00.<br>Report on fish and contaminant indicators of estuarine condition, FY01.<br>Correlations among water and sediment chemistry, pollutant loadings, and ecological condition of coastal estuaries, FY04<br>Report on the relationship between sediment quality and benthic community distribution and condition, FY04. | Michael Lewis<br>850-934-9382<br>Kevin Summers<br>850-934-9244<br>Virginia Engle<br>850-934-9354 |
|      | NERL/EERD    | <b>Development of Indicators as Measures of Ecosystem Sustainability</b> - Indicator methods can be used to measure PAH exposure, to determine exposure exceeding natural background, and to evaluate changes in exposure to petroleum and combustion by-product (PAH) waste in dredged streams.                  | Draft report on national background and exposure criteria for indicators of exposure to PAHs (9/02).   | Brian Hill<br>513-569-7077<br>Susan Cormier<br>513-569-7995                                      |
|      | NHEERL/GED   | <b>Improved protocols to determine hazards of contaminated sediments in the Gulf of Mexico</b> - Development of existing field and laboratory data collected over the past 10 years in Gulf of Mexico estuaries to assess improvements in protocols for hazard assessments.                                       | Improved protocols to determine hazards of contaminated sediments in the Gulf of Mexico, FY03  | Michael Lewis<br>850-934-9382  |
|      | NHEERL/GED   | <b>Assessment of reference conditions in estuaries of the Gulf of Mexico</b> - This field study includes the assessment of reference conditions for sediment contaminants and their seasonal and spatial variabilities.   | <i>Identification of sensitive benthic species, FY99.</i><br><br>Reference conditions for sediments in Gulf of Mexico, FY01.   | Michael Lewis<br>850-934-9382  |

| Area | Organization                      | Description   | Product/Estimated Date<br><i>GPRA APGs/APMs in italics</i>                      | Contact  |
|------|-----------------------------------|---|---|--|
|      | NERL/EERD                         | <b>Develop Indicators for Stressors in Environmental Media and Mixtures</b> - Development of tests that can be used to determine toxicity of site samples of sediment, water, or discharge. Includes: Regional-scale toxicity assessment of sediment in the Mid-Atlantic and Southern Rockies - to demonstrate the utility of probability-based surveys to assess sediment contamination in EMAP samples; 7-day amphipod ( <i>Hyaella azteca</i> ) lethality and growth assays were used. Warm water fish embryo larval test - to assess potential exposure/effects from sediments. | Methods manual for sediment toxicity sample collection (9/00).                  | Jim Lazorchak<br>513-569-7076<br>Susan Cormier<br>513-569-7995   |
|      | NERL/EERD                         | <b>Indicator Development and Assessment of Large Rivers and Watersheds</b> - New methods can be used to detect impairment in large rivers needing sampling by boat. Includes microbial metabolism of sediment.  | Bioassessment protocol for large non-wadable rivers in the mid-Atlantic (9/01). | Florence Fulk<br>513-569-7379<br>Susan Cormier<br>513-569-7995   |
|      | NCER/<br>STAR grants and<br>HSRCs | Response of Methylmercury Production and Accumulation to Changes in Hg Loading: A Whole-ecosystem Mercury Loading Study   |   | Cynthia C. Gilmour,<br>Andrew Heyes, Robert<br>P. Mason, and John M.<br>Rudd   |
|      | NCER/<br>STAR grants and<br>HSRCs | Validation of Sediment Quality Criteria in Southeastern Estuaries   |   | Amy Huffman<br>Ringwood  |
|      | NCER/<br>STAR grants and<br>HSRCs | Application of Sediment Quality Criteria for Metals to a Montane Lotic Ecosystem: Field Validation During Reclamation of a Copper Mine Causing Acid Mine Drainage   |   | Joseph S. Meyer, Jeffrey<br>A. Lockwood, Richard<br>W. Rockwell  |
|      | NCER/<br>STAR grants and<br>HSRCs | Sediment Contamination Assessment Methods: Validation of Standardized and Novel Approaches  |   | G. Allen Burton, Jr.,<br>Daniel Krane, Thomas<br>Tiernan, Peter Landrum,<br>William Stubblefield<br>and William Clements |

| Area | Organization                      | Description   | Product/Estimated Date<br><i>GPRA APGs/APMs in italics</i> | Contact   |
|------|-----------------------------------|---|--|---|
|      | NCER/<br>STAR grants and<br>HSRCs | Meiofaunal Validation of EqP-Based Sediment Quality Criteria for Metal Mixtures in Estuarine Sediments Population to Community-Level Culturing Studies of Biogeochemical Controls on Bioavailability and Toxicity |  | G. Thomas Chandler and<br>Timothy J. Shaw               |
|      | NCER/<br>STAR grants and<br>HSRCs | Developing a New Monitoring Tool for Benthic Organisms in the Gulf of Mexico Loss of Genetic Variability in Meiofaunal Populations  |  | Paul A. Montagna  |
|      | NCER/<br>STAR grants and<br>HSRCs | Bioavailability of Organic Contaminants in Estuarine Sediments to Microbes and Benthic Animals  |  | Gary L. Taghon, David<br>S. Kosson and Lily Y.<br>Young |
|      | NCER/<br>STAR grants and<br>HSRCs | Environmental Monitoring and assessment of Wetlands Using Sedimentary Diatoms from Present and Past   |  | R. Jan Stevenson  |
|      | NCER/<br>STAR grants and<br>HSRCs | Sediment Entrainment and Stream Benthic Communities: Implications for Freshwater Bioassessment  |  | Stephen Kenworthy                                       |
|      | NCER/<br>STAR grants and<br>HSRCs | Studies of the environmental fate of sediment-associated organic contaminants in marine systems   |  | P. Lee Ferguson   |
|      | NCER/<br>STAR grants and<br>HSRCs | Investigation on the Fate and Biotransformation of Hexachlorobutadiene and Chlorobenzenes in a Sediment-Water Estuarine System  |  | Pavlostathis  |

| Area   | Organization | Description  | Product/Estimated Date<br><i>GPRA APGs/APMs in italics</i> | Contact                           |
|--|--------------|--|--|-----------------------------------|
| <b>Remediation/<br/>Risk Management</b><br><br>Activities related to remediating or otherwise managing the risks of contaminated sediments. These activities advance the state-of-the-art by development and verification of methods, models, protocols, and technologies. | NRMRL/LRPCD  | <b>Remediation of PCB-Contaminated Sediments</b> - This Congressionally-mandated study by the National Academy of Science is intended to evaluate the relative effectiveness, effects, and costs associated with a variety of methods for managing PCB-contaminated sediments. NAS has formed a committee to evaluate existing information and develop a framework for making sediments management decisions.  | <i>NAS report due to EPA and Congress, APM A81, FY01.</i>  | Dennis Timberlake<br>513-569-7547 |
|  | NRMRL/LRPCD  | <b>Critical Review of Cost Estimation Techniques for Risk Management Options of Contaminated Sediments</b> - Survey and critical review of the cost-estimation tools that are applicable to the evaluation of options for the risk management of contaminated sediments at differing levels of model sophistication.   |  | Dennis Timberlake<br>513-569-7547 |
|  | NRMRL/LRPCD  | <b>Dredging Performance</b> - Dredging is a standard tool for managing contaminated sediments, but past applications have not fully documented the risk reduction achieved, nor have they fully addressed questions of potential short-term negative impacts. The effectiveness of dredging is being documented by the combined evaluation of past projects and completion of selected projects to fill data gaps. One product of this project is a report on the environmental and human health benefits of contaminant mass removal. Other products will include reports on projects that evaluate short-term impacts, such as temporary resuspension and re-exposure of previously buried layers of contaminated material and volatilization of contaminants during material handling and disposal. |  | Dennis Timberlake<br>513-569-7547 |

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|------|--------------|---|--|--|
|      | NRMRL/LRPCD  | <b>Capping Performance</b> - Engineered caps are used to isolate contaminated sediments from benthic infauna and the water column. This research area is investigating questions about the performance and permanence of caps. Data on completed projects is being collected to determine performance of caps and the accuracy of models intended to predict their performance. Selected field studies are being conducted to address specific questions related to short-term disturbances created during cap placement; permanence of cap performance; contaminant migration through caps and the accuracy of predictive models; and benthic and aquatic community responses to caps. Caps are being evaluated for applications in situ and in confined aquatic disposal sites.<br>Terry Lyons NRMRL/LRPCD 513-569-7589                       |  | Dennis Timberlake<br>513-569-7547<br>Terry Lyons<br>513-569-7589                                 |
|      | NRMRL/LRPCD  | <b>Monitored Natural Attenuation</b> - MNA is being proposed by many responsible parties as the preferred management option for contaminated sediments, despite the fact that there is little field data to support the effectiveness and permanence of MNA or to quantify the mechanisms responsible for attenuating adverse effects. This research area is investigating past performance at sites where MNA was selected intentionally and at sites where studies have been conducted over time without remedial action. Additional field studies are being conducted to fill data gaps, examine specific attenuation mechanisms, and collect data on long-term performance. Selected laboratory studies are being conducted to determine rates of contaminant sorption/desorption, and both rates and endpoints of contaminant degradation. |  | Dennis Timberlake<br>513-569-7547<br>Dick Brenner<br>513-569-7657<br>Fran Kremer<br>513-569-7346 |

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|------|--------------|--|---|--|
|      | NRMRL/LRPCD  | <b>Ex-Situ Management and Treatment Technologies</b> - Confined disposal facilities (CDFs) and upland disposal facilities are frequently used for management of sediments dredged for remediation purposes and contaminated sediments dredged to maintain navigation in harbors and waterways. This research area encompasses the performance of CDFs in managing risks from contaminated sediments disposed in hydraulic contact with the water body, treatments that can be applied to enhance the effectiveness of CDFs, and treatment/utilization of dredged material to recover CDF capacity. Ongoing projects include chemical and physical treatment to isolate inorganic contaminants from transport back to the water body and biological treatments to degrade organic contaminants so the sediments can be removed from the CDF and perhaps utilized. | <i>Peer reviewed journal article on biotreatment of PAH - contaminated sediments, APM 159, FY99</i><br><br><i>Peer reviewed journal article on treatment of chlorinated organics in sediment, APM 160, FY99</i> | Ed Barth<br>513-569-7669<br>Dick Brenner<br>513-569-7657 |
|      | NRMRL/LRPCD  | <b>SITE Demonstrations of Innovative Technologies</b> - The Superfund Innovative Technology Demonstration Program has included contaminated sediment sites in the past two solicitations. Three vendor technologies have been accepted for demonstration: Minergy's glass forming process, IGT's Cement Block process, and AquaBlok's capping process. Additional projects are in the selection process currently.   |   | Annette Gatchett 513-569-7697                            |



| Area | Organization                      | Description  | Product/Estimated Date<br><i>GPRA APGs/APMs in italics</i>                     | Contact  |
|------|-----------------------------------|--|--|--|
|      | NRMRL/LRPCD                       | <b>Innovative In-Situ Treatment Technologies</b> - This research area is investigating a range of potential treatments to destroy organic contaminants in in-place sediments or to make organic or inorganic constituents unavailable for both transport to the water column and uptake by benthic and aquatic organisms. Ongoing bench research is investigating the use of hydrogen and zero-valent iron to respectively stimulate biological and chemical dechlorination of persistent chlorinated organic compounds such as PCBs, PCP, and DDT and the application of a particular microorganism to re-speciate lead into a sparingly soluble phosphate mineral. | Journal article on hydrogen addition - FY01<br>Journal article on Fe(0) - FY01 | Dennis Timberlake<br>513-569-7547<br>Greg Sayles<br>513-569-7607<br>Wendy Davis-Hoover<br>513-569-7206 |
|      | NCER/<br>STAR grants and<br>HSRCs | Microbial Community Dynamics of PCB Dechlorination in Sediments  |  | G-Yull Rhee, Roger C<br>Ellen Braun-Howland  |
|      | NCER/<br>STAR grants and<br>HSRCs | Importance of Reductive Dechlorination in Chesapeake Bay Sediments Role of Sulfate Respiration   |  | Douglas G. Capone, J<br>Baker, and Cynthia C.  |
|      | NCER/<br>STAR grants and<br>HSRCs | Effectiveness of Regulatory Incentives for Sediment Pollution Prevention Evaluation Through Policy Analysis and Biomonitoring  |  | Seth Reice and Richar<br>Andrews   |
|      | NCER/<br>STAR grants and<br>HSRCs | Biotic and Abiotic Reductive Transformation of Chlorinated Solvents in Iron Reducing Sediments   |  | Michael L. McCormic  |
|      | NCER/<br>STAR grants and<br>HSRCs | Reduction of Herbicides in Wetland Sediments   |  | Theodore Klupinski   |
|      | NCER/<br>STAR grants and<br>HSRCs | Nitrogen Removal in Constructed Wetlands: Enhancement of Nitrate Mass Transfer in the Denitrification Zone   |  | Maia Fleming   |

| Area | Organization                      | Description  | Product/Estimated Date<br><i>GPRA APGs/APMs in italics</i> | Contact   |
|------|-----------------------------------|--|--|---|
|      | NCER/<br>STAR grants and<br>HSRCs | Investigation of the reductive transformation of chlorinated solvents in iron reducing sediments and to assess the relative contributions of biological and abiotic reactions to dechlorination. |  | Mike McCormick  |
|      | NCER/<br>STAR grants and<br>HSRCs | Reductive Dechlorination and Degradation of Model Chlorophenols in Marine and Estuarine Sediments  |  | Kimberly Warner   |
|      | NCER/<br>STAR grants and<br>HSRCs | Enhanced Microbial Dechlorination of PCBs and Dioxins in Contaminated Dredge Spoils  |  | Max M. Höggblom and<br>Cecilia Vargas                   |
|      | NCER/<br>STAR grants and<br>HSRCs | Evaluation of Placement and Effectiveness of Sediment Caps   |  | D. D. Reible, K. T.<br>Valsaraj and L. J.<br>Thibodeaux |
|      | NCER/<br>STAR grants and<br>HSRCs | Isolating Organisms Which Dechlorinate Polychlorinated Biphenyls (PCBs)  |  | Tiedje  |
|      | NCER/<br>STAR grants and<br>HSRCs | Development of a Model Sediment Control Ordinance for Louisiana  |  | Donald Barbe, Ph.D.                                     |
|      | NCER/<br>STAR grants and<br>HSRCs | Bioremediation of Sediments Contaminated with Polynuclear Aromatic Hydrocarbons  |  | J. B. Hughes and C. H.<br>Ward                          |
|      | NCER/<br>STAR grants and<br>HSRCs | The Application of Plant Biotechnology in Bioremediation of Contaminated Sediments   |  | S.V. Sahi   |
|      | NCER/<br>STAR grants and<br>HSRCs | Bioremediation of Contaminated Sediments and Dredged Material  |  | Ward, Hughes  |

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|  | NCER/<br>STAR grants and<br>HSRCs | The Effect of Sediment Treatment on Sediment Metabolism Rates in Marsh Mesocosms  |  | Cornwell (Liebert)                |
|  | NCER/<br>STAR grants and<br>HSRCs | Characterization of PAH Degrading Bacteria in Coastal Sediments   |  | M. G. Tadros                      |
|  | NCER/<br>STAR grants and<br>HSRCs | Mechanisms governing the release of contaminants from sediments resuspended during dredging operations  |  | Davies, Voice                     |
|  | NCER/<br>STAR grants and<br>HSRCs | Use of chemical oxidants for the degradation of chlorinated benzenes and biphenyls in aqueous systems and sediments   |  | Masten, Davies                    |
|  | NCER/<br>STAR grants and<br>HSRCs | An Investigation of Chemical Transport from Contaminated Sediment through Porous Containment Structures   |  | Reible, Thibodeaux, Valsaraj      |
| <b>Communication /Information Exchange</b><br><br>Technology transfer and technical support activities both internally and externally. These activities include information databases and workgroups formed to foster communication. | OSWER/TIO<br>NRMRL/LRPCD<br>OERR  | <b>Sediments Action Team, Remediation Technologies Development Forum</b> - A partnership with industry to develop or advance innovative remediation technologies. |  | Dennis Timberlake<br>513-569-7547 |
|  | NCER/<br>STAR grants and<br>HSRCs | Website to publicize ongoing and completed projects   |  |                                   |
|  | NCER/<br>STAR grants and<br>HSRCs | A Short Course of Remediation of Contaminated Soils and Sediments   |  | Kelly, Keefer, Rohde, Woldt       |

#### ORGANIZATIONAL UNIT KEY

ORD

Office of Research and Development

|             |   |
|-------------|---|
| NHEERL      | National Health and Environmental Effects Research Laboratory |
| AED         | Atlantic Ecology Division                                     |
| GED         | Gulf Ecology Division   |
| MED         | Mid-Continent Ecology Division                                |
| WED         | Western Ecology Division                                      |
| NERL        | National Exposure Research Laboratory                         |
| EERD        | Ecological Exposure Research Division                         |
| ERD         | Ecosystems Research Division                                  |
| CEAM        | Center for Exposure Assessment Modeling                       |
| EPIC        | Environmental Photographic Interpretation Center              |
| ESD         | Environmental Sciences Division                               |
| MSCTSC      | Monitoring and Site Characterization Technical Support Center |
| NCEA        | National Center for Exposure Assessment                       |
| W           | Washington Office   |
| NRMRL       | National Risk Management Research Laboratory                  |
| LRPCD       | Land Remediation and Pollution Control Division               |
| ETSC        | Engineering Technical Support Center                          |
| NCER        | National Center for Environmental Research                    |
| STAR grants | Science to Achieve Results (STAR) grants                      |
| HSRCs       | Hazardous Substance Research Centers                          |